

Claims

[1]

What is claimed is:

1. A catalyst for dimethyl ether synthesis via dehydration reaction of methanol comprising:
 - (a) hydrophobic zeolite with proton;
 - (b) cations selected from the group consisting of alkali metal, alkaline earth metal, and ammonium; and
 - (c) inorganic binders selected from the group consisting of alumina, silica, and silica-alumina.
2. The catalyst for dimethyl ether synthesis according to claim 1, wherein the $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of said hydrophobic zeolite is between 20 and 200.
3. The catalyst for dimethyl ether synthesis according to claim 1, wherein said cations are impregnated in the range of from 20 to 90 mole% with respect to proton of the hydrophobic zeolite.
4. The catalyst for dimethyl ether synthesis according to claim 1, wherein said inorganic binders are contained in the range of from 0.5 to 50 wt. ratio with respect to the zeolite impregnated with cations selected from the group consisting of alkali metal, alkaline earth metal, and ammonium.
5. The catalyst for dimethyl ether synthesis according to claim 1, wherein said silica-alumina is clay.
6. The catalyst for dimethyl ether synthesis according to claim 1, wherein said catalyst is prepared in the form of granules, extrudates, tablets, balls, and pellets.
7. A method for manufacturing a catalyst for dimethyl ether synthesis comprising,
 - (1-i) adding an aqueous acidic solution or water to at least one inorganic binder selected from the group consisting of boehmite, silica sol, and clay in order to convert the mixture into pastes;
 - (1- ii) extrusion of said pastes to form a shape after mixing them with hydrophobic zeolite particles and salts or hydroxides of alkali metal or alkaline earth metal; and
 - (1- iii) drying said formed product and calcining it at 500 - 800 °C .
8. The method for manufacturing a catalyst according to claim 7, wherein said aqueous acidic solution is at least one aqueous acidic solution selected from the group consisting of nitric acid, acetic acid, and phosphoric acid.

9. The method for manufacturing a catalyst according to claim 7, wherein an organic binder selected from polyvinyl alcohol and carboxymethyl cellulose is further added during the step of said (1-i) or (1-ii).
10. The method for manufacturing a catalyst according to claim 7, wherein said salts of alkali metal or alkaline earth metal are nitrate or carbonate salts.
11. A method for manufacturing a catalyst for the synthesis of dimethyl ether comprising,
 - (2-i) impregnating salts or hydroxides of alkali metal or alkaline earth metal into hydrophobic zeolite, drying the resultant and calcining it at 400 - 800 °C to obtain solid particles;
 - (2- ii) adding an aqueous acidic solution or water to at least one inorganic binder selected from the group consisting of boehmite, silica sol, and clay in order to convert the mixture into pastes;
 - (2- iii) extrusion of said solid particles and pastes to form a shape; and
 - (2- iv) drying said formed product and calcining it at 500 - 800 °C .
12. The method for manufacturing a catalyst according to claim 11, wherein said aqueous acidic solution is at least one aqueous acidic solution selected from the group consisting of nitric acid, acetic acid, and phosphoric acid.
13. The method for manufacturing a catalyst according to claim 11, wherein an organic binders selected from polyvinyl alcohol and carboxymethyl cellulose is further added in the step of said (2-i) or (2-iii).
14. The method for manufacturing a catalyst according to claim 11, wherein said alkali metal or alkaline earth metal salts are nitrate or carbonate salts.
15. A method for manufacturing a catalyst for the synthesis of dimethyl ether, wherein
 - (3-i) adding an aqueous acid solution or water to at least one inorganic binder selected from the group consisting of boehmite, silica sol, and clay in order to convert the mixture into pastes;
 - (3- ii) extrusion of the mixture of said pastes and hydrophobic zeolite particles to form a shape;
 - (3- iii) drying said formed product and calcining it at 500 - 800 °C ;
 - (3-iv) impregnating an aqueous solution of ammonium hydroxide or ammonium salts into said formed product;
 - (3- v) calcining said impregnated formed product at 300 - 400 °C .
16. The method for manufacturing a catalyst according to claim 15, wherein said

aqueous acid solution is at least one aqueous acid solution selected from the group consisting of nitric, acetic, and phosphoric acids.

17. The method for manufacturing a catalyst according to claim 15, wherein an organic binder selected from polyvinyl alcohol and carboxymethyl cellulose is further added in the step of said (3-i) and (3-ii).